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THE

AMERICAN NATURALIST.

VOL. XVIII.—*SEPTEMBER*, 1884.—No. 9.

NOTES ON A NEVADA SHELL (PYRGULA NEVADENSIS).

BY R. ELLSWORTH CALL AND C. E. BEECHER.

THIS form was described by Dr. R. E. C. Stearns[1] from material furnished in part by one of the present writers. The description was based upon the external characters presented by the shell alone, for at that time material containing soft parts had not been discovered. Since the printing of the description opportunities were afforded us to make extensive collections of recent and Quaternary shells in the Great Basin, and the biologic and climatologic results of our study are now being formulated for publication under the auspices of the United States Geological Survey.

The examinations made along the south and west shores of Pyramid lake, Nevada, demonstrated the existence of this form, Pyrgula, in countless thousands in that remarkable body of water. At a single locality more than a gallon was obtained, associated with many hundreds of *Pompholyx effusa* Lea, and many *Physa humerosa* Gould. From this material a large number of specimens, containing the dried animals, was assorted and sent to Mr. Beecher, who has successfully worked out the dentition, and described it as below:[2]

The genus Pyrgula has not received a uniform treatment at the hands of systematists, none of whom have yet studied the dentition, and most of whom have never seen even the shell. Nearly or quite all who have based their opinions upon actual study of shells, have been obliged to content themselves with such external characters as the shells furnish, and these are often most unsatisfactory. Pyrgula is operculated, carinated, and with the spire well elevated, thus presenting features which might excuse a reference of it to the Melaniidæ, which has been actually made by most authors. Until the work of Stimpson[1] on the Rissoidæ the genus appears to have been placed in some most remarkable positions. At that time nothing was known except the obvious characters furnished by the test, and some observations by Moquin-Tandon on the form common to the rivers of the mountainous portions of France,—*P. bicarinata* Bourg.

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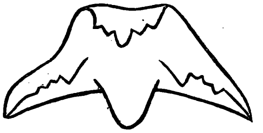
[1] Proc. Phila. Acad., 1883, pp. 171–176, with figure.

[2] Mr. Beecher is alone responsible for the dentition as here given. His work is most careful and painstaking, and we hope jointly to present, in the course of time, very much more of his careful work in dentitions.

In the system here provisionally adopted from Stimpson,[2] Pyrgula lies between Paludestrina and Tryonia, having superficial characters intermediate to those genera. Dr. W. H. Dall has suggested, in a recent letter, that possibly the Pyramid lake shell would be found to rank in Amnicola, basing his opinion upon the operculum, which certainly possesses some Amnicoloid characters, and upon the produced anterior part of the aperture, as mentioned in the generic description by Christoforo and Jan. But now the work of Mr. Beecher for the first time enables us to correctly place it among the Rissoidæ. My collaborator has made no comparisons with figures resulting from the work of others, and I hence introduce here a few notes based upon the observations of Troschel, Moquin-Tandon, Stimpson and myself.

The formula for the rhachidian tooth of the genus Amnicola is $\frac{3.1.3}{4.1.4}$. The tooth itself is about three times broader than high (Fig. 6), has a greater number of basal denticles than the corresponding tooth of Pyrgula; the formula for that genus being $\frac{4.1.4}{1.1}$. The peculiar tongue-shaped process of this tooth in Amnicola is entirely wanting in Pyrgula, and the lateral lobes are more denticulate. Paludestrina has a similar formula for the rhachidian tooth—$\frac{4.1.4}{1.1}$—but differs in other important particulars.



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Rhachidian tooth of *Amnicola porata* Say. Enlarged from Stimpson.

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[1] "Researches on the Hydrobiinæ and allied forms." Smithsonian Misc. Coll., No. 201, 1865.

[2] *Loc. cit.*, p. 47.

Comparing these formulæ, the necessity of complete separation from Amnicola is sufficiently obvious. Whether the produced aperture of Pyrgula, as figured by Chenu,[1] is of generic value is quite uncertain, for Pyrgula is most certainly a vegetarian. Though the genus is said to be confined to the fresh waters of the mountainous areas which it inhabits, it is, in the North American localities, found in brackish water-lakes alone.

It may profitably be further noted that the dentitions given by Troschel, Moquin-Tandon and Stimpson differ very much, even more than should be allowed to pass without comment. It has been found by Mr. Beecher, and corroborated by the senior author, that many descriptions are imperfect and will need revision. To this end we invite collectors to send to our addresses any of the smaller species of fresh-water univalves which may chance to occur in their localities.

Following is the description of

THE DENTITION OF PYRGULA NEVADENSIS.

Jaw thin, membranaceous.

Odontopore $.62^{mm}$ in length, and $.15^{mm}$ in width. There are usually fifty-five transverse rows of teeth, arranged according to the formula 3–1–3, which is common to the family Rissoidæ.

Rachis distinct, occupying one-fourth the width of the ribbon. Rhachidian tooth (Fig. 1) short and broad, with the infero-lateral angles produced and slightly arcuate. On each side of the anterior face is a strong, short, conical process or basal tooth projecting outwards and somewhat downwards. Basal margin trilobate; central lobe truncate. Cusp curved forwards and extended into a strong denticle with four smaller ones on each side. The formula of the denticles for this tooth would therefore be $\frac{4+1+4}{1+1}$.

Body of intermediate tooth (Fig. 2) subrhomboidal, with the infero-interior angle slightly produced and with an angulation in the margin above. From this point there is a thickening or ridge extending towards the fixed end. Peduncle longer than the body of the tooth. Upper margin abruptly curved forwards and marked by seven denticles, of which the third inner one is usually the largest; the formula for this tooth may be written $2 + 1 + 4$.

Inner lateral tooth (Fig. 3) spoon-shaped, with the infero-interior margin angular. Upper anterior margin marked with a fringe of about twenty-four denticles decreasing in length from the inner extremity. Peduncle straight, wider than the body.

Outer lateral tooth (Fig. 4) falciform, straight along the peduncle. Anterior margin and extremity denticulated with thirty minute denticles, usually decreasing in length towards the distal extremity, but subject to some variation. The denticulate margin extends more than one-third the length of the tooth. Peduncle slender and nearly straight.

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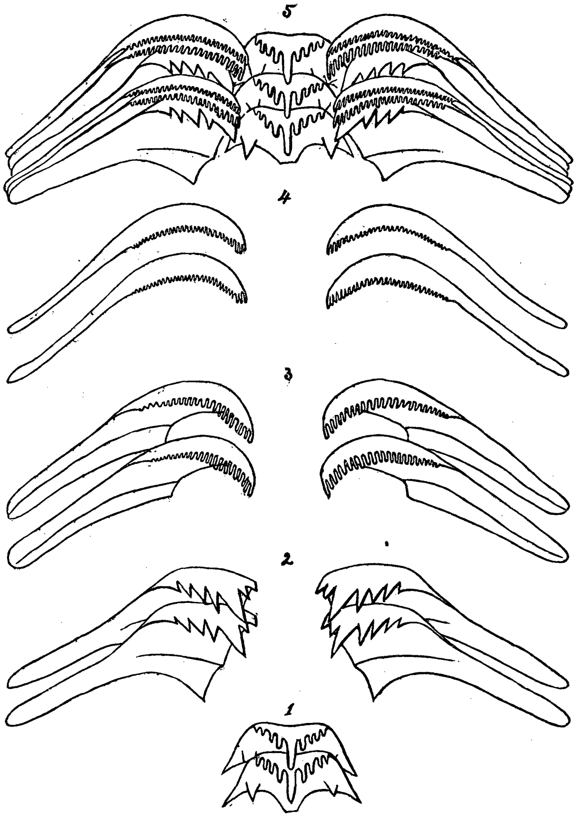
[1] Manuel de Conchyliologie, Tome I, 294, Fig. 2029.

[2] R. Ellsworth Call, Des Moines, Iowa, or to C. E. Beecher, 273 Hudson ave., Albany, N. Y.

The formula for the denticles is $30-24-7-\frac{4+1+4}{1+1}-7-24-30$.

There is a marked variation in the character of the denticles on the intermediate and lateral teeth. On the intermediate they are large, angular and somewhat irregular. The lateral teeth are uniformly marked by a regular fringe of slender denticles, which are much smaller on the outer lateral.

Some portions of the membrane and different specimens show considerable variation in the length and strength of the denticles on the lateral teeth, and sometimes their number seems subject to some mutation. The numbers given in the formulæ were averaged from several enumerations, and represent the comparative denticulation of the teeth.



Lingual dentition of *Pyrgula nevadensis* Stm., × 500 (Beecher).

DESCRIPTIONS OF FIGURES.

FIG. 1.—Rhachidian teeth.

FIG. 2.—Intermediate teeth.

FIG. 3.—Inner laterals.

FIG. 4.—Outer laterals.

FIG. 5.—A portion of the odontophore representing the teeth in their natural position. All enlarged to 500 diameters.

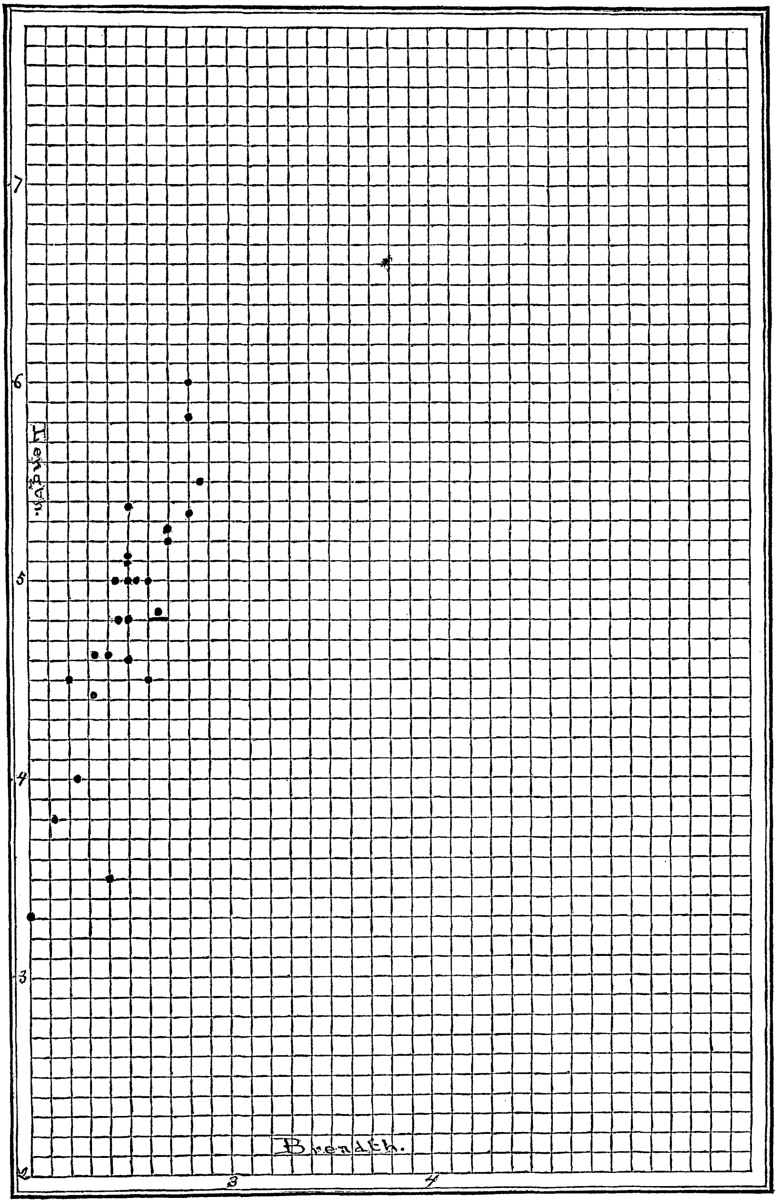


Chart showing Variations of Pyrgula nevadensis. (Each dot represents a shell.)

Pyrgula nevadensis varies in size within rather wide limits. Twenty-five specimens, taken at random, present the following averages: Length 4.83^{mm}; breadth 2.65^{mm}. These proportions are best shown graphically, as are also the extremes of variation, by the accompanying plate, XXV, in which 2^{mm} is adopted as the origin of the coördinates. Each small square represent a .10^{mm}. The dot underlined represents the *average* of the specimens measured. At some future time more complete notes on this species, and on those inhabiting the salt springs and lakes of the Great Basin, from a biological standpoint, will be presented the readers of the NATURALIST.

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ASPECTS OF THE BODY IN VERTEBRATES AND ARTHROPODS.

BY A. S. PACKARD.

UNDER the title "Aspects of the Body in Vertebrates and Invertebrates" (London, 1883), the venerable and distinguished English anatomist and palæontologist, Professor Sir Richard Owen, renews in a vigorous way the old discussion originally begun by Geoffroy St. Hilaire. The view in question is tersely presented in St. Hilaire's answer to Dugès, quoted by Professor Owen, when he replied by reference to "Fig. 2 de la septième planche: Là se trouve effectivement représenté un homard couché sur le dos et montrant distinctivement ses viscères dans la position où le sont les viscères des mamifères placés sur le ventre." This view was combatted by Cuvier, and in this respect he has been followed by Gegenbaur.

In his able essay Professor Owen places himself on the side of St. Hilaire, and the special point in vertebrate anatomy which he brings forward to support this opinion is the homology of the conario-hypophysial tract, which he regards as "the modified homologue of the mouth and gullet of invertebrates;" and at the end of chapter I he concludes that "the surfaces or aspects of the body which are truly homologous in the snake and caterpillar are the *neural* and the *hæmal*, not the *dorsal* and the *ventral*."

In his second chapter, entitled "Cerebral homologies in vertebrates and invertebrates," Professor Owen quotes our statement[1]

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[1] Second report U. S. Entomological Commission. Chapter XI. The brain of the Locust, p. 224. 1880.